

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 30990088 W0	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 00/ 00504	International filing date (day/month/year) 15/02/2000	(Earliest) Priority Date (day/month/year) 15/02/1999
Applicant HEWLETT-PACKARD COMPANY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

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☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/00504

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F1/00 G06F12/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98 25372 A (VOLTAIRE ADVANCED DATA SECURIT) 11 June 1998 (1998-06-11) abstract; figure 1 page 3 -page 3 claims 1-34 ---	1-20
A	WO 97 37305 A (INTEL CORP) 9 October 1997 (1997-10-09) abstract; figure 1 claims 1-45 ---	1-20
A	EP 0 849 657 A (NCR INT INC) 24 June 1998 (1998-06-24) abstract -----	20

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search

30 March 2000

Date of mailing of the international search report

06/04/2000

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
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Authorized officer

Powell, D

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/00504

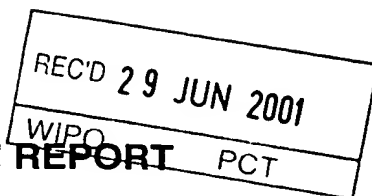
Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9825372	A	11-06-1998	US 5969632 A	19-10-1999
			AU 5065998 A	29-06-1998
			EP 0948771 A	13-10-1999
WO 9737305	A	09-10-1997	US 6009527 A	28-12-1999
EP 0849657	A	24-06-1998	JP 10282884 A	23-10-1998

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



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Applicant's or agent's file reference 30990088 WO		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/00504	International filing date (day/month/year) 15/02/2000	Priority date (day/month/year) 15/02/1999	
International Patent Classification (IPC) or national classification and IPC G06F1/00			
Applicant HEWLETT-PACKARD COMPANY et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 15/09/2000	Date of completion of this report 27.06.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Harms, C Telephone No. +49 89 2399 7476 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00504

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-21 as originally filed

Claims, No.:

1-20 as originally filed

Drawings, sheets:

1-8 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/GB00/00504**

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-20
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-20
Industrial applicability (IA)	Yes:	Claims	1-20
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

SECTION V

Reference is made to the following document:

D1: http://www.its.blrdoc.gov/fs-1037/dir-024/_3535.htm

The document was not cited in the international search report. A copy of the document is appended hereto.

- 1 Having regard to document D1, it is stated that a hybrid network topology combining a bus topology and a star topology is to be considered a matter of normal design procedure and does not lead to any new or surprising effect beyond what the skilled man would expect from a combination of such network topologies.

In particular, taking account to the following references to D1, the subject-matter of independent claim 1 so far as understood (see section VIII) is not inventive because D1 discloses

a computing apparatus (see "hybrid topology" line 13) comprising:
a trusted hardware module (see "central node" line 28 of star topology);
a plurality of hardware modules (see "nodes" of bus topology in line 8 and "nodes" of star topology in line 27)
a shared communication infrastructure by which the hardware modules can communicate with each other (see bus topology lines 8-9); and
a first communication path distinct from the shared communication infrastructure, by which a first one of the hardware modules can communicated directly with the trusted hardware module but cannot communicate directly with any other of the hardware modules (see star topology lines 27-38).

The "central node" of the star topology needs insofar to be "trusted" as its activity is crucial to the operation of the star topology network.

The particular combination of bus topology and the star topology is merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances and without the exercise of inventive skill.

In view of the above, independent claim 1 is not inventive.

- 2 However, it shall be appreciated that the subject-matter of the present application differs from that of D1 in that the hardware modules communicate confidential information over the first communication path and not over the shared communication infrastructure. Since the first communication path cannot be eavesdropped by the other hardware modules, the confident messages do not need to be encrypted. Other, non-confident information is communicated via the shared communication infrastructure.

Consequently, one possible way to overcome the above objection would be to restrict claim 1 insofar as confident messages are exclusively communicated over the first communication path.

Such an amendment is allowable since it is disclosed within the application as originally filed (see e.g. description page 2 bottom); Art. 19(2) PCT.

With regard to the documents cited in the search report, such an amendment would introduce new and inventive subject-matter as well. In none of these documents a star network topology is employed to communicate confident messages. In WO 9825372 the secured network 8 (which corresponds to the first communication path) is a bus which can be eavesdropped by all connected devices 20, 30, 40 (see Fig. 1). Thus every confident message needs to be encrypted.

- 3 In the dependent claims 2-20 minor modifications to the system as defined in the respective head claims are set out, all of which, when not directly deducted from the teachings of D1 and the documents cited in the search report, relate to routine measures normally to be expected of the skilled person.

SECTION VII

- 1 It appears that lines 13-14 of the description should read as "(...) require the addition of such a separate computing engine (...)" and not as "(...) require the addition of a separate such computing engine (...)".
- 2 The term "Intel's Pentium processor" used on page 3 line 17 appears to be a registered trade mark and should have been identified as such.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/00504

- 3 "and lines 28" on page 8 line 29 should read as "and address lines 28"; see also description page 10 line 17.
- 4 "non-volatile memory" on page 10 lines 34-35 should have been provided by reference number 4 (and not 35).
- 5 "volatile memory" on page 11 line 30 should have been provided by reference number 4 (and not 3).
- 6 Step 520 "Device accessed?" in Fig. 4 should read as "Trusted Device (24) accessed?".
- 7 "non-volatile memory location 4" on page 12 line 11 should read as "volatile memory location 4"
- 8 "trusted device" on page 12 line 33 should have been provided by reference number 24 (and not 14).
- 9 "data bus" on page 12 line 34 should have been provided by reference number 26.

SECTION VIII

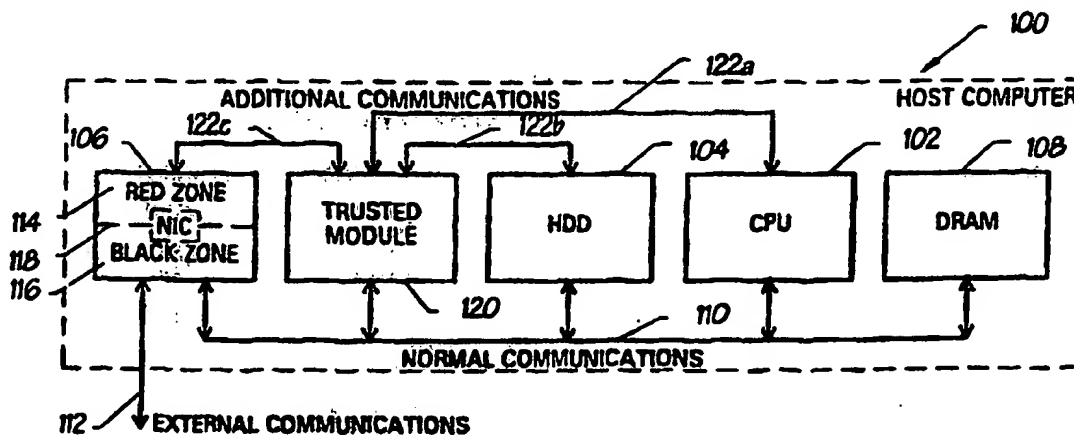
- 1 The terms "further hardware modules" in line 3 and "modules" in lines 4 and "further modules" in lines 7 and 9 appear to denote the same devices. Thus said devices should have been denoted identically, accordingly to Rule 10.2 PCT.
- 2 The same objection is raised against the terms "shared communication infrastructure" of line 4 and "communication infrastructure" of lines 6-7 of claim 1.
- 3 The same objection is raised against the terms "trusted hardware module" of line 2 and "trusted module" of line 8 of claim 1.
- 4 Several of the above mentioned features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : G06F 1/00, 12/14		A1	(11) International Publication Number: WO 00/48062
			(43) International Publication Date: 17 August 2000 (17.08.00)
(21) International Application Number: PCT/GB00/00504		(81) Designated States: JP, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).	
(22) International Filing Date: 15 February 2000 (15.02.00)			
(30) Priority Data: 99301100.6 15 February 1999 (15.02.99) EP 99306416.1 13 August 1999 (13.08.99) EP		Published With international search report.	
(71) Applicant (for all designated States except US): HEWLETT-PACKARD COMPANY [US/US]; 3000 Hanover Street, Palo Alto, CA 94304 (US).			
(72) Inventors; and			
(75) Inventors/Applicants (for US only): PROUDLER, Graeme, John [GB/GB]; 5 Touchstone Avenue, Meade Park, Bristol BS12 6XQ (GB). CHAN, David [GB/US]; 16112 Mays Avenue, Monte Sereno, CA 95030 (US).			
(74) Agent: LAWRENCE, Richard, Anthony; Hewlett Packard Limited, Intellectual Property Section, Filton Road, Stoke Gifford, Bristol BS34 8QZ (GB).			

(54) Title: COMMUNICATIONS BETWEEN MODULES OF A COMPUTING APPARATUS



(57) Abstract

A computing apparatus comprises a plurality of hardware modules (102, 104, 106) and a shared communication infrastructure (110) by which the modules can communicate with each other in the usual way. In order to increase the level of trust and security in the apparatus, a trusted hardware module (120) is also provided and is connected to the other modules by respective communication paths (122a; 122b; 122c), distinct from the communication infrastructure, by which each of those modules can communicate directly with the trusted module but cannot communicate directly with any other of the modules. The trusted module can therefore have secure communications, for example of "unsafe" data, with each of the other modules without any of the remaining modules eavesdropping, and the trusted module can route unsafe data between any pair of the other modules, or decline to provide such routing, for example in dependence on policy stored in the trusted module.